

NOTES ON THE PHILIPPINE POND SNAILS OF THE GENUS VIVIPARA, WITH DESCRIPTIONS OF NEW SPECIES.

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During the recent expedition of the U. S. Bureau of Fisheries steamer *Albatross* to the Philippine Islands every opportunity was used to make extensive collections of fresh-water as well as land and marine shells. Among the fresh-water forms *Vivipara* proved especially interesting, particularly those of Lake Lanao, Mindanao, where we secured no less than 6 gallons of living shells. It was from this lake that I described *Vivipara lanaonis* Bartsch,^a with forms *alpha* to *lambda*, of which I now figure a fully adult shell, pl. 34, fig. 1. The greater part of the material collected by me in Lanao falls under this species and will form the basis of a special report to be published later.

We were unable to find *Vivipara polyzonata* Frauenfeld anywhere in the Philippines, which makes it appear as if the species did not occur in the islands.

VIVIPARA BULUANENSIS SOLANA, new subspecies.

Plate 34, fig. 2.

Shell similar to *V. buluanensis* proper, but more depressed, with much less inflated whorls and much narrower umbilicus; base less rounded, with a well-marked angle at edge of the umbilicus; in *V. buluanensis* this is well rounded.

The type and another specimen (Cat. No. 207777, U.S.N.M.) comes from Rio Similao, Mindanao. They were donated to the U. S. National Museum by Father Sola, the director of the Museo Ateneo, Manila, for whom it is named. The type has six whorls and measures: Length, 30 mm.; diameter, 23 mm. Four additional specimens (Cat. No. 207778, U.S.N.M.), also from the Museo Ateneo, were collected at Rio Talisayan, Mindanao. Considerable more material from both of these localities is in the Museo Ateneo.

^a Proc. U. S. Nat. Mus., vol. 32, 1907, pp. 145-147, figs. 1-10.

VIVIPARA CEBUENSIS, new species.

Plate 34, fig. 3.

Shell broadly conic, exterior dark olive with a brownish tinge, interior purplish, lighter at the edge, peritreme with a black edge. Early nuclear whorls small and smooth, forming a decided mucro; later ones like the succeeding turns. Post-nuclear whorls inflated, roundedly shouldered and appressed at the summit; marked by a slender raised peripheral thread and numerous fine spiral lirations, of which those on the well-rounded base are better developed than those occurring between the sutures. Those of the base are also of more even development and spacing than those of the spire. Base narrowly umbilicated; edge of umbilicus scarcely angulated; aperture very broadly oval, outer lip thin, showing the external sculpture within by transmitted light; columella partly reflected over the umbilicus.

The type (Cat. No. 207782, U.S.N.M.) and a lot of specimens were found living by the writer in a boggy, brush-covered field, which in the wet season must form a rather extensive lake, near Compostela, Cebu.

The type has six whorls and measures: Length, 31.8 mm.; diameter, 24.6 mm.

VIVIPARA MINDANENSIS MAMANUA, new subspecies.

Plate 34, fig. 4.

Shell similar to *V. mindanensis* in outline, but more openly umbilicated. In the present form the malleations are confined to the base, while in *mindanensis* proper they extend over the entire surface. The coarse spiral threads of *mindanensis* are obsolete in *mamanua*, which has the entire surface marked by very fine, closely spaced spiral lirations.

The type and another specimen of *V. m. mamanua* (Cat. No. 207779, U.S.N.M.) were donated to the U. S. National Museum by the Museo Ateneo of Manila, which contains additional material. They come from Lake Maimit, Mindanao.

The type has five whorls remaining, which measure: Length, 30.5 mm.; diameter, 29.5 mm.

VIVIPARA PARTELLOI, new species.

Plate 34, figs. 5, 6.

Shell thin, broadly conic, with a strong peripheral keel made up of triangular segments which give it a stellate appearance; color greenish yellow. Nuclear whorls eroded. Post-nuclear turns rather inflated between the keel and the appressed summit and well rounded on the base. Peripheral keel compressed and smooth on the early whorls; on the last two it is composed of a series of hollow triangular projections, arranged in a cone in cone manner, twelve of which occur upon the last whorl and nine upon the preceding. Sutures well con-

stricted. Entire surface of periphery and base marked by strong lines of growth and exceedingly fine closely spaced spiral striations. Aperture subcircular; posterior angle obtuse; outer lip rendered } shaped by the peripheral keel, thin, columella strongly curved; peritreme continuous, black edged; interior bluish white striated with smoky lines.

The type (Cat. No. 207780, U.S.N.M.) and a good series of specimens were collected by myself in Lake Lanao, Mindanao. The type has five whorls and measures: Length, 39.0 mm.; diameter, 33.8 mm.

It gives me pleasure to name this species for Maj. Joseph M. T. Partello, through whose kindness my trip to Lake Lanao was made possible.

VIVIPARA CLEMENSI, new species.

Plate 34, figs. 7, 8.

Shell very broadly conic, strongly shouldered, marked by many spiral cords; greenish horn-colored externally, streaked with darker varices, dark brown within, excepting the edge, which is whitish. Nuclear whorls small. Post-nuclear whorls very strongly, almost tabulatedly, shouldered at the summit, marked by three strong spiral keels, the first of which is at the periphery and the third at the angle of the shoulder, which is about halfway between the periphery and the summit; the second keel falls a little anterior to the middle of the space between the two. In addition to these strong keels the whorls are marked by two strong cords on the shoulder, while another of equal strength divides the space between the three keels. Base well rounded, marked by many subequal and subequally spaced wavy spiral threads. Entire surface of the shell marked by many fine decidedly retractive lines of growth and numerous very fine spiral striations. Aperture very broadly obovate; outer lip thin, rendered slightly wavy by the spiral keels showing the external sculpture within, the spiral keels and cords appearing as dark brown bands; columella moderately curved; peritreme edged with black.

Two specimens out of a large lot (Cat. No. 207781, U.S.N.M.) are selected and figured as eotypes. They show the range of variation in the strength of sculpture; they have five whorls and measure respectively: Length, 35.0 and 34.3 mm.; diameter, 29.0 and 26.5 mm.

They were collected by Rev. Joseph Clemens, at Camp Keithley, north end of Lake Lanao, Mindanao, and the species is named for him.

EXPLANATION OF PLATE 34.

All figures natural size.

Fig. 1. *Vivipara lanaonis* Bartsch.

2. *Vivipara buhuanensis solana* Bartsch.

3. *Vivipara cebuensis* Bartsch.

4. *Vivipara mindanensis mamananua* Bartsch.

5, 6. *Vivipara partelloi* Bartsch.

7, 8. *Vivipara clemensi* Bartsch.